Quarterly Report

May 1 - July 31, 1970

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GRADUATE SCHOOL OF BUSINESS ADMINISTRATION / UNIVERSITY OF SOUTHERN CALIFORNIA
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WESRAC

Western Research Application Center

SECOND QUARTERLY REPORT

Period Ending July 31, 1970

Contract No. NASW - 1869

(February 1, 1970 - January 31, 1971)

WESTERN RESEARCH APPLICATION CENTER

Graduate School of Business Administration
University of Southern California
Los Angeles, California 90007

wesrac
WESTERN RESEARCH APPLICATION CENTER
computerized access to world technology

August 15, 1970

Chief, Dissemination and Program Evaluation Branch (Code UT)
Technology Utilization Division
Office of Technology Utilization
National Aeronautics and Space Administration
Washington, D. C. 20546

Dear Sir:

The attached quarterly report reviews the operation of WESRAC for the period May 1, 1970 through July 31, 1970, performed in conjunction with contract # NASW - 1869.

Distribution, as shown below, is being made in accordance with contract requirements.

We will be glad to provide additional facts or explanations on activities during the period covered by this report if they are desired.

Very truly yours,

A. K. Oulie

A. Kendell Oulie
Director

AKO:kjd

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HIGHLIGHTS

1. Seminar Workship: Fluidics

85 scientists and engineers attended the Fluidics Seminar Workshop sponsored by WESRAC in cooperation with the Small Business Administration and the NASA MSFC West Coast Office.

2. "Sales"

This quarter saw the greatest net increase in client users in WESRAC history: 15 new Contract Clients and 14 new Special Clients.

3. Engineering and Scientific Applications Operations

104 retrospective searches were conducted during the quarter. In addition, 18 Current Awareness Searches were being provided at the end of the quarter, setting a new WESRAC high.

4. Document and Report Production

4,485 abstracts and citations were produced during the second quarter. This exceeds by more than 1000 WESRAC's previous record.

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APPENDICES

I

INTRODUCTION

This report covers activities of the Western Research Application Center for the second quarter period 1 May - 31 July, 1970. WESRAC is a Regional Dissemination Center for the NASA technology collection and other approved sources. The report is prepared in accordance with requirements of Article XV, Paragraph A5, National Aeronautics and Space Administration Contract No. NASW - 1869 for the year beginning February 1, 1970.

WESRAC is organized at the University of Southern California, Los Angeles, as part of the Graduate School of Business Administration under the administration and financial control of the USC Research Institute for Business and Economics.

II

PHYSICAL PLANT, EQUIPMENT AND PERSONNEL

A. Physical Plant

The center continues to operate in two remodled former residences and to use the IBM 360-30 computer located in the University Business School. These arrangements are adequate for current operations and for those predictable in the immediate future.

B. Equipment

No new major equipment was acquired during the period covered by this report.

C. Personnel

During this period WESRAC continued its efforts to upgrade its staff. The following indicates WESRAC personnel by department at the end of the second quarter:

Department	Full-time	Part-time
Director's Office	2	0
Administration	1	2
Marketing	3	2
Engineering and Scientific Applications	3	5
Information Systems	6	3
	15	12

III

ADMINISTRATION

A. Department Status

Early in the first quarter, the organizational structure of WESRAC was modified on a tentative basis to utilize special skills of an available employee. Departmental status was given to the function which assumed the operational and administrative responsibilities that did not fit logically into other WESRAC departments, to coordinate those tasks which require cooperative efforts of more than one department, and to assume special responsibilities as assigned. The new department is shown on the Organization Chart, Appendix A.

B. Employee Training

One of the special responsibilities assumed by the Administration Department is the preparation of employees for maximum contribution to WESRAC objectives. Training efforts programmed by this department, include formal exposure to all WESRAC activities and to the principles of technology utilization.

C. Client Education

Another area of concern has been the apparent lack of a complete understanding on the part of clients of the benefits inherent in continuous use of large computerized collections such as the NASA collection and the other data sources available at WESRAC. The slide briefing, designed to stimulate greater client utilization and understanding of WESRAC services has been completed.

With similar objectives in mind, WESRAC has arranged to produce a film describing the services offered. This will also be useful in educating prospective clients in sales presentations, and at conventions and exhibits in which WESRAC participates.

D. Seminar/Workshop: Fluidics

WESRAC, in cooperation with the Small Business Administration and the NASA MSFC West Coast Office, sponsored the Fluidics Seminar/Workshop. Eighty-five scientists and engineers participated in the two day session, June 11th and 12th, at the University of Southern California.

Fundamental theory of Fluid Logic Controls were presented by seven well known men in the fluidics field on the first day, and on the second day the latest available hardware was demonstrated in operation by manufacturers of fluidics equipment. Appendix B includes a detailed agenda of the seminar.

Follow-up calls to participants indicate that favorable exposure resulted from the well attended and highly informative seminar.

IV

MARKETING

A. The WESRAC Product

Current Awareness and Retrospective Searches continue to be the basic literature search services offered by WESRAC. Although computer searching, based on carefully prepared custom strategies, constitutes the great bulk of service in both areas, manual searching is still offered to a client where this, because of the nature of the problem, is a better means for uncovering relevant data.

Efforts are continuing to develop expanded subject area coverage in the non-customized current awareness abstract reports, or Standard Interest Profile (SIP). An expanded SIP program, including approximately three times as many subjects, is being finalized.

B. Merchandising, Promotion & "Sales"

1. Direct Contact with Prospects

During this quarter three service representatives devoted full time to calls on prospects and clients. 150 personal visits with clients and prospective clients and 448 telephone contacts to arrange appointments and to respond to inquiries were completed. During the last week of the quarter, one of the sales representatives traveled to Northern California to call on clients and prospects in that area.

2. Annual Client Retainer Requirements

On May 1, 1970, the minimum annual client retainer was reduced to $500.00. Companies which can anticipate greater annual use will receive services at lower unit costs by depositing retainers of $1,500.00 or $5,000.00. This discount amounts to 10% and 20% respectively. Firms depositing retainers of $500.00 or more are considered Contract Clients. Firms requesting individual searches are considered Special Clients, and are provided services at 20% over Contract Client charges.

3. Direct Mail Solicitation

Three direct mail campaigns were conducted during this quarter. The first two consisted of mailing the WESRAC Newsletter to our computerized list of over 10,000 prospects and clients. While direct response was highly desireable, our main objective was to achieve favorable exposure, and to educate prospective clients on the services WESRAC provides.

The third mail campaign was a specialized letter sent to 195 consulting engineers, introducing WESRAC services and illustrating the NASA category index and examples of abstracts.

This letter and the two WESRAC Newsletters appear in Appendix C.

4. "Sales"

Encouraging forcasts for added client users made during the first quarter proved to be correct. The second quarter saw the

greatest increase in client users in WESRAC's history. Fifteen new Contract Clients and 14 new Special Clients were added. Three of the 15 new Contract Clients had previously been Special Clients; three others were generated by the Fluidics Seminar/ Workshop.

C. Publicity

1. Newspaper Articles

a. Long Beach Press-Telegram

A series of six articles dealing with NASA programs and resultant technology transfers appeared in the Long Beach Press-Telegram May 3 - 7. The fourth article in the series, which appears in Appendix D1, specifically names each of the RDC's as well as names of several prominent clients and their success using the information retrieval service.

b. Industrial News

Industrial News published an interview with A. K. Oulie, Director of WESRAC, in both its Northern and Southern California issues, on June 22, 1970. This article is also included in Appendix D.

2. Television and Radio Publicity

Free television and radio spots were again provided by local stations in Los Angeles. This type of coverage, since it must be very brief and is often scheduled at less than ideal times, has not generated the same positive responses that can be obtained by publicity carried in pertinent business and professional organs.

3. Group Presentations

WESRAC representatives appeared before four (4) civic and professional groups during the quarter to make presentations of the NASA Technology Dissemination program. The groups addressed and numbers attending are listed below:

Date	Group	No. Attending
May 21	General Telephone	60
June 4	General Telephone	60
July 8	Society for Marine Technology	10
July 17	Los Angeles County Medical Library	13

V

ENGINEERING AND SCIENTIFIC APPLICATIONS

A. Operations

A total of 104 retrospective searches were requested and processed from May 1 through July 31. While this exceeds the number of searches completed in the first quarter, the average turn around time (period from receipt of search request to mailing of completed WESRAC report) remained at about 7 calendar days. Minimum and maximum times continued to be one and fourteen days respectively.

Overall efforts by both Marketing and Engineering to encourage utilization by clients of customized Current Awareness Searches has resulted in growing success. Eighteen CAS's were being provided to Contract Clients at the end of the quarter.

WESRAC conducted an extremely successful search for Dr. Ivar K. Ugi, a prominent chemist at the University of Southern California, and has been acknowledged in his book, Isonitile Chemistry, to be published this Fall by the Academic Press. Dr. Ugi is anxious to help WESRAC acquaint other members of the academic community with the benefits of utilizing WESRAC's information retrieval services, particularly the CAS program.

B. Follow-up Procedure

The follow-up procedure, which is essentially a tickler system that ensures routine contacts with the recipients of search reports by the assigned specialist, has shown good results. First, an immediate evaluation of the search can be made by the client, and problems or additional data needed can be handled expeditiously. Second, by demonstrating WESRAC's concern with client satisfaction we hope to promote further usage of our services.

VI

INFORMATION SYSTEMS

A. Document and Report Production

Abstracts and citations generated by the increasing amounts of searches conducted by WESRAC during the second quarter yielded 4,485 abstracts and citations; this figure exceeds by more than 1000 the previous record. As expected, document production figures are up from last quarter. A full time clerk has been added to the staff to assist with the increased production in this department.

B. Computer Operations

The major effort of the Computer Operations staff was the preparation of the Linear File Search Program in 360 code for a NASA/ STIMS BIBLIOGRAPHIC TAPE. The basic system design of the new 360 Linear File Search Program is developed from the latest 1401 MOS II Linear Search System. It uses similar system concepts such as coded terms, weight, Boolean Logic and Polish Notation routine.

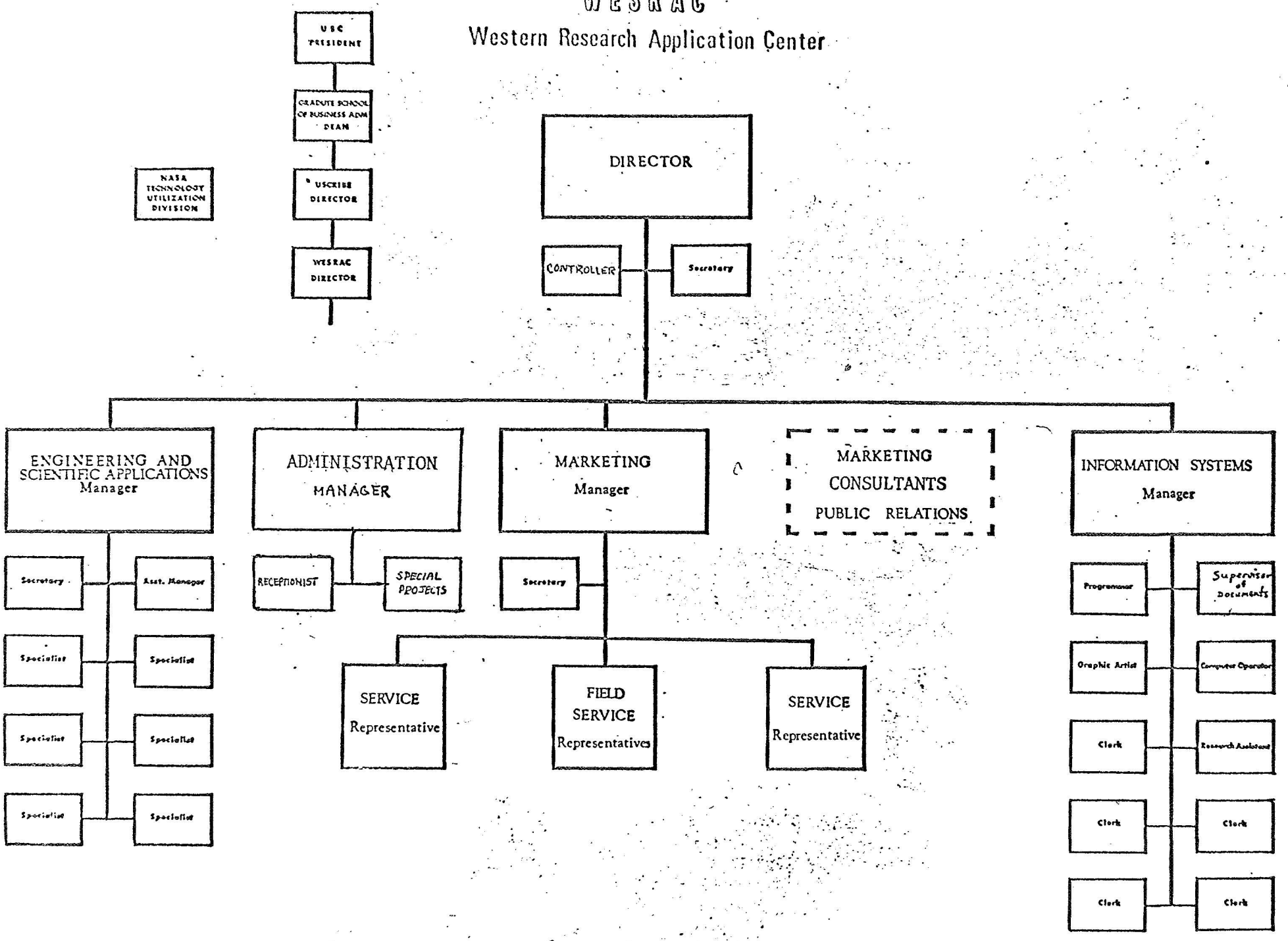
To aid in preparing this and other programs necessary for the updating of the WESRAC Data Banks, a part-time computer programmer was added to the staff during this quarter.

APPENDIX A

Organization Chart

WESRAC

Western Research Application Center



APPENDIX B

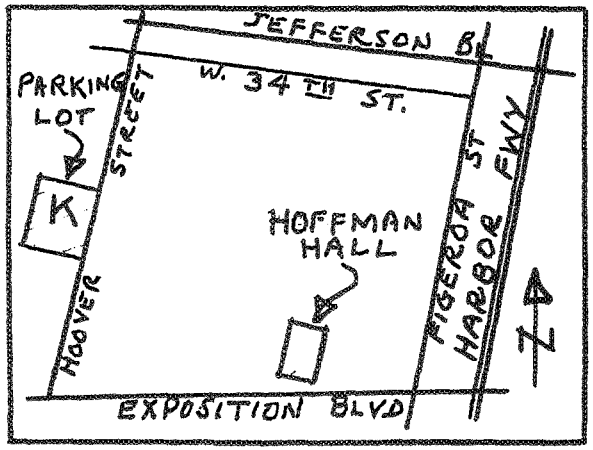
1. Program of the Fluidics Seminar/Workshop
2. Photographs of the Fluidics Seminar/Workshop

WHEN

THURSDAY JUNE 11, 1970 8:00 A.M.
FRIDAY JUNE 12, 1970

WHERE

AUDITORIUM — HOFFMAN HALL
ON THE CAMPUS OF THE
UNIVERSITY OF SOUTHERN CALIFORNIA
USE PARKING LOT K ON
HOOVER STREET JUST SOUTH OF
W. 34th ST. & FOLLOW SIGNS.



FEE

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REGISTRATION

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SMALL BUSINESS ADMINISTRATION

NASA

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ANNOUNCES
A WORKSHOP ON

FLUID LOGIC CONTROL

JUNE 11 & 12, 1970

To provide management and production line supervisors with the elementary theory of Fluid Logic Control Systems and to demonstrate the latest advances in Fluid Logic Hardware.

SMALL BUSINESS ADMINISTRATION

AGENDA

THURSDAY — JUNE 11
AUDITORIUM — HOFFMAN HALL USC

8:00 - 8:30	REGISTRATION
8:30 - 8:50	Introduction — Announcements & Program Overview Moderator — Jack Lang - SBA
8:50 - 9:35	Explanation of Control Functions & Symbols Used Speaker — Charles Mangion - TRW
9:35 - 10:15	Converting English Language to Digital Logic Equations Speaker — Dr. Herbert Nottage, P.E. - UCLA
10:15 - 10:30	Coffee
10:30 - 11:15	Converting Digital Logic Equations to Hardware Diagrams Speaker — Guy Dean, Double A Division, Brown & Sharpe
11:15 - 11:45	The Air Supply Speaker — Paul Jaffe - Pall Trinity Micro Corp.
11:45 - 1:15	Lunch
1:15 - 2:00	Conceptual Approaches to Fluid Logic Control Components, Moving Parts Speaker — Ed Holbrook, P.E. - Pneucon, Inc.
2:00 - 3:00	Conceptual Approaches to Fluid Logic Control Components, Non-Moving Parts. Speaker — Dr. William Griffin, Northrop Corporate Laboratories
3:00 - 3:15	Coffee
3:15 - 4:00	I Use Fluid Logic Control Devices for Profit Speaker — Anthony Whalley - Harvey Aluminum
4:00 - 4:45	Government Technical Information for Your Use Speaker — Jack Lang - SBA
4:45 -	Question-and-Answer Period to Panel of All Speakers

Friday, June 12

The participants will be divided into workshop-size groups. Each manufacturer will demonstrate his hardware in operation after which participants may handle and examine the hardware with any questions discussed informally on a personal basis.

REGISTRATION APPLICATION

FLUID LOGIC CONTROL WORKSHOP — JUNE 11 & 12 1970

NAME _____ TITLE _____

NAME _____ TITLE _____

ORGANIZATION _____ PHONE _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

WORKSHOP FEE $15.00 PER REGISTRANT

MAKE CHECKS PAYABLE TO WESRAC AND MAIL TO:

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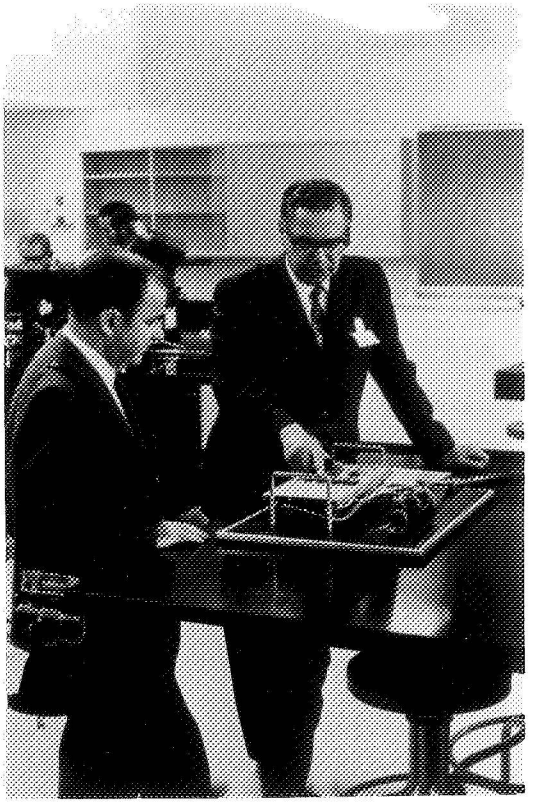

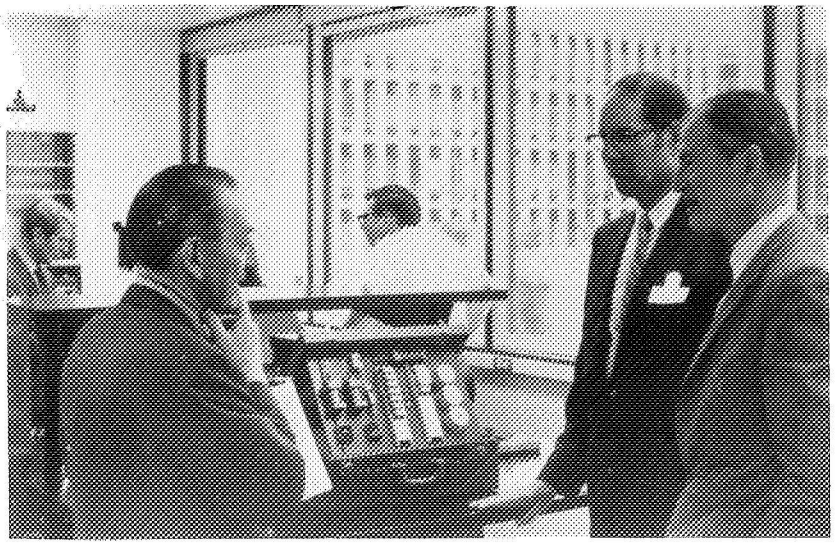

News shots of WESRAC - S.B.A. Fluidics Seminar held at U.S.C.'s new Seaver Science Building - at close of spring semester - lower left corner - Jack Lang, S.B.A. - A.K. Oulie, Dir. WESRAC
Dale Thompson of Parker-Hannifin (Montebello)

APPENDIX C

1. WESRAC Newsletter, Volume II
2. WESRAC Newsletter, Volume III
3. WESRAC letter to Consulting Engineers

WESRAC NEWSLETTER

WESTERN RESEARCH APPLICATION CENTER
Graduate School of Business Administration University of Southern California
809 West 34th Street Los Angeles, California 90007 (213) 746-6132

VOL. I, No. II MAY 1970

WESRAC in Action

WESRAC, Western Research Application Center, now in its 3rd year of operation, concerns itself with the dissemination of billions of dollars worth of data collected by NASA from such Federal Departments as Defense, Transportation, and Atomic Energy Commission. The National Aeronautics & Space Administration has also provided the funds to use the vast computerized indices of the most important learned societies in the USA, such as the Societies for Chemistry, Engineering and Textiles. Since NASA has collected, translated, abstracted and computerized this vast amount of data, the only cost to you is that of screening the data and compiling the material.

HERE IS HOW WE WORK

After defining what you want, you fill out a "Search Specifications Form" to guide our retrieval efforts. The information needed on this form includes a general statement of the problem, or subject of inquiry. These statements would include such qualifications, limitations, key words, and synonyms as may be needed to enable a sharply focused search.

Armed with the search specifications, our engineers work to devise computer strategies designed to extract the pertinent information concerning your subject. The computer run will provide the engineers with a print-out of citations of documents satisfying your information needs.

THE FINAL PRODUCT

Our engineer studies then these results, as well as those which may come from a manual library search. He then selects the reports which he considers to be most useful and pertinent to you. After evaluation of the abstracts and elimination of irrelevant material, abstracts are reproduced and sent to you. After having reviewed these abstracts, you may order full copies of those documents which you desire.

Words you Should Know

	Number of Taped References In WESRAC Data Banks
Module	2535
Miniaturization	321
Ambient	668
Topology	1055
Ecology	767
Symbiosis	8
Microfiche	85
Gerontology	9
Inertial Guidance	745
Fluidics	515

(see last page for definitions)

Changing Times

TWO THOUSAND PAGES OF INFORMATION BEING PRINTED EVERY MINUTE

Thousands of scientists and researchers in government and private industry, and hundreds of universities are producing new technology faster than it can be distributed, let alone read.

The purpose of the Regional Dissemination Center, WESRAC, is to enable you to find what you need from this deluge of documents, when you need it, swiftly, and inexpensively.

TWENTY THOUSAND DIFFERENT SUBJECT MATTERS

WESRAC's data banks contain detailed and current information on everything from astigmatism to zenographics—from pollution to social psychiatry.

To diminish the time gap between discovery and application—to eliminate professional and geographical boundaries which now impair the movement of technology—to facilitate better means for transferring information from developers to potential producers—this is our way of keeping ahead of the changing times.

WESRAC Co-sponsoring Workshop at the University of Southern California

The Small Business Administration, along with WESRAC, the Graduate School of Business Administration at USC, and several manufacturers and distributors are planning to co-sponsor a workshop on Fluid Logic Control (Fluidics).

The study session is planned for mid-June or later and will, in addition to presenting theoretical explanations of FLC, demonstrate the hardware currently available. See the next WESRAC Newsletter for the time, place, and exact date of the proposed seminar.

●

WESRAC Completes Drug Affects Search

WESRAC has just completed an extensive data search for one of the largest research organizations in the country. The client's inquiry requested data on the effect that drugs have on one's driving ability.

WESRAC'S RETRIEVAL EFFORTS

The problem as stated was: "To identify and produce literature on the effects of drugs and narcotics other than alcohol on the driving skill of humans. The client is especially interested in quantitative data on manual skill, reaction time and judgment factors of humans under the influence of drugs."

The key words used to narrow the tremendous amount of documents written on drugs in general were:

Drugs	Driving
Narcotics	Judgment
Skill	Reaction time

HUNDREDS OF DOCUMENTS AVAILABLE

The computer print-out yielded hundreds of documents concerning the problem stated. After our engineers studied the output and discarded those documents which seemed the least pertinent, some 42 documents were left, composed of more than 635 pages of important information. Many of these were translations of Russian, German, French, Danish, Italian, Swedish, Swiss, and Czech scientific literature, and also included Canadian and British documents. None of these documents were written earlier than 1965 and most of them have appeared within the last year or two.

WESRAC keeps up with the current problems of society and supplies knowledge that prevents you from "Inventing the Wheel All Over Again." Call WESRAC for help in solving your problems.

USC Scientists Develop Instrument Package to be sent to Jupiter in '72

Dr. Darrel L. Judge and Robert Carlson of the University of Southern California's Physics Department were awarded a contract for more than $750,000 from NASA, to design an instrument package to be sent on the first spacecraft flight to Jupiter in 1972, which will afford science its first closeup study of the planet's atmosphere.

Weighing less than two pounds, the device, according to its designers who have made similar devices for earth atmosphere exploration, will be similar in function to light meters used by photographers.

PRINCIPAL MISSION OF DEVICE

Specifically, the device's principal mission is to determine the amounts of primary constituents in Jupiter's atmosphere. That is, it will be designed to pinpoint relative amounts of molecular hydrogen and atomic helium.

The device will be sensitive to ultra-violet light rays. It will detect amounts of hydrogen and helium by "looking at" molecules and atoms that have absorbed light from the sun.

The device will transmit atmospheric data back to earth via radio signal.

SPACECRAFT WILL NOT RETURN TO EARTH

Information is expected to be transmitted before, during, and possibly after the Jupiter fly-by. Judge said the spacecraft will not return to earth, but will keep going in outer space with its signal becoming weaker, until it is never heard from again.

"We only know about Jupiter's atmosphere from remote observation. The planned fly-by of the planet with our instrumentation will give science the first closeup analysis of it," Dr. Judge said.

The scientists explained that a knowledge of the ratio of the two elements and the exact percentage of the atmosphere which they constitute is important because "then we will have a significant insight into the atmosphere of the planet." An understanding of the atmosphere, in turn, may be a key in time to understanding the evaluation of the solar system.

VALUE OF SPACEFLIGHT

"Knowledge of Jupiter's atmosphere will give us information about conditions before and during the formation of the solar system, so a better study of how planets were formed will be possible," he said.

Although classified as pure, basic research, there also may be more immediate practical significance: it is conceivable that man some day will go to Jupiter and other planets.

(USC Trojan Family—Feb/March '70)

Nimbus 3 Elk Tracking Experiment

KEY WORD—ECOLOGY

One of the least known and vital studies in ecology concerns the migratory habits of non-domestic animals. For several years the Department of Interior has been trapping deer found in state parks, tagging them and transplanting them north of Santa Barbara.

Hunters were requested to return the tags to the Department of Interior. Deer, starting from central California, were found as far north and east as Wyoming. According to zoologists, such distant migration was "impossible." Deer are supposedly unable to cross wide water barriers.

SATELITE TRACKING TECHNIQUES

Another experiment to study the migratory habits of large animals began in mid-February. A wild, 500-pound female elk was fitted with a collar containing a small antenna, transmitter, receiver, batteries and solar cells, designed to withstand environmental temperatures and pressures.

A system aboard NASA's Nimbus 3 weather satellite will interrogate the collar twice daily, recording data on air and animal skin temperature, altitude above sea level, as well as light intensity and location; thus determining the location of the elk within about one mile.

This current experiment developed out of a Smithsonian Institution meeting of leading ecologists in 1966, initiated by Dr. Sidney R. Galler, Assistant Secretary (Science) of the Institution. It is sponsored by NASA's Office of Space Science and Applications, the Smithsonian Institution and the Department of Interior.

The Interrogation Recording and Location System (IRLS) aboard Nimbus 3 was originally designed for precise location of free drifting balloons, floating buoys, aircraft and other moving surface stations.

AEROSPACE ON EARTH

Satellite tracking of animals is an important step in ecological studies because of the ease and variety in the collection of data. There are no time limitations and no human contact to cause deviations in the animal's behavior. Discussions are now in progress concerning the possibility of tracking a wider variety of animals—elephant, blue whale, grizzly bear and sea turtle.

Plastic Ships?!!

A shipbuilder at Bremerhaven, Germany, has received his first order for a 50-foot plastic "cutter". It is more expensive than comparable-sized wooden cutters. However, maintenance costs will be practically nonexistent since polyester doesn't rust and a water hose can be used to clean it. Only the masts and some fittings are of non-plastic materials.

(Chemistry In Action)

The WESRAC NEWSLETTER, issued every six to eight weeks by the Western Research Application Center at USC, is intended to provide current information relating to WESRAC's activities and special events concerned with the utilization of new technology. We encourage contributions from our readers of articles which may be of interest to WESRAC and the rest of our reading audience. Send any contributions to: WESRAC, 809 West Thirty-fourth Street, Los Angeles, California 90007.

Word Definitions You Should Know

(See Page 1)

MODULE: a compact assembly functioning as a larger unit.

MINIATURIZATION: the making of industrial and technical devices smaller and more compact; as by using transistors instead of electrol tubes.

AMBIENT: environmental; surrounding on all sides; an encompassing atmosphere:

TOPOLOGY: a branch of mathematics that investigates the properties of a geometric configuration which are unaltered if the configuration is subject to any 1 to 1 transformation.

ECOLOGY: a branch of biology that deals with the relations between living organisms and their environment.

SYMBIOSIS: the simultaneous action of seperate agencies which, together, have greater total effect than the sum of their individual effects.

MICROFICHE: small sheet of microfilm about the size of an index card used for storing data.

GERONTOLOGY: a scientific study of the phenomena of aging and the problems of the aged.

INERTIAL GUIDANCE: guidance (as of a missle or aircraft) by means of self-contained automatically controlling devices that respond to inertial forces.

FLUIDICS: uses the interaction of fluid stream-air/gas or/liquid-to perform many functions of instrumentation and information processing, without the use of moving parts and under the adverse conditions encountered in rigorous environments—the name comes from a contraction of fluid and logic.

WESRAC

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Graduate School of Business Administration University of Southern California
809 West 34th Street Los Angeles, California 90007

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809 West 34th Street Los Angeles, California 90007 (213) 746-6132 TWX 910-321-2981

VOL. I, No. III JUNE 1970

Fluid Logic Control (Fluidics) Workshop

As was announced in the last WESRAC Newsletter, WESRAC, along with the Small Business Administration, is sponsoring a workshop on FLUIDICS to be held at the University of Southern California on June 11 and 12. The registration fee of $15 includes all materials, lunches, coffee and parking.

The purpose is to provide management and production supervisors with the elementary theory of Fluid Logic Control Systems and to demonstrate the latest advances in Fluid Logic Hardware.

The first day will include various speakers on topics ranging from an explanation of control functions and symbols to conceptual approaches to FLC; the second day, participants will be divided into workshop-size groups. Each manufacturer will demonstrate his hardware in operation after which participants may examine the hardware with informal discussions of individually oriented questions.

For further information and registration cards write WESRAC, 809 W. 34th St., Los Angeles, 90007.

Words You Should Know

	Number of References in WESRAC Data Banks
False-drop*	
Hardcopy*	
Strategy	304
Hardware	1266
Software	163
Boolean Logic	314

*computer terminology
(See last page for definitions)

How Information is Recorded

NASA has pioneered in automating the storage, retrieval, and dissemination of aerospace information and data.

The NASA Scientific and Technical Information Facility, in College Park, Maryland, receives hundreds of documents daily. These are promptly checked to avoid duplication, examined for relevance, and cataloged descriptively. Each document accepted as a potentially valuable addition to this information bank is then given an accession number and, if appropriate, is recorded on microfiche. The accession number serves as a unique identification tag for the document thenceforth, and both compact and full-size copies of every page can be made from the microfilm for storage and distribution.

Professional indexers examine each item when it is deposited in the system, document the bibliographic data that accompanies it, and select terms under which it is listed in subject and other indexes.

Trained abstractors read the abstracts submitted with documents, sometimes edit and condense these summaries, and write abstracts of documents which have been received without them. Then, after further reviewing, complete bibliographic records are placed in the memory of a high-speed electronic computer. From then on, the machine provides ready access to the citations of all documents for all users.

From the day a document is acquired, it can be located quickly by its accession number. This number can be ascertained from other bibliographic information in the computer. A searcher need only know the corporate source, or the authorship, or the subject, or the number assigned to the documents in another U.S. Government agency's information system, or the number of a contract under which the work was performed, to be directed to a report he needs.

(The NASA Scientific and Technical Information System)

A Major Problem of Our Technological Age

At a recent exhibit attended by scientists in industry and research, a senior scientist of one of the nations largest corporations approached the WESRAC booth and asked what WESRAC meant - what does it do?

Our man explained that WESRAC is a dissemination center for one of the largest and most comprehensive collections of data banks (seven) in the nation containing information on over 20,000 subjects and upward of 2 million documents. The visiting scientist nodded and signed a card requesting more information. As he was filling out the card he told why he was interested in WESRAC.

USELESS EXPENDITURE OF TIME, EFFORT AND MONEY

During the many years he has worked with bright young men in his organization, he went on, the waste of costly talent and time appalled him. Waste squandered on investigations which had been done and abondoned years ago. Sadly, he recalled the hundreds of thousands of dollars lost in endless attempts to develop new things: "Inventions" which had already been created by his own company. Some had been patented and discarded years ago.

THE SOLUTION

The real hazard lies in the failure of researchers and developers to take advantage of services such as WESRAC's to determine, *in advance,* what has and is being done on their particular projects and avoid the futile consumption of man-power and money. Just as a patent attorney turns *first* to the general area of the client's application - so should all researchers be required to check the "state of the art" before plunging into a new project.

Nimbus-3 Now Tracking Second Elk

On February 24, the first elk to be tracked by satellite (see WESRAC Newsletter - Vol. I, No. 1, March) died of a pneumonia-type disease not uncommon to the herd during the winter months. An autopsy indicated there was no connection between the death and tracking equipment.

APRIL 2, 1970

NASA's Nimbus-3 weather satellite has successfully contacted and is now tracking a second 500-pound female elk fitted with the specially-designed electronic collar.

Prior to this, the elk had worn a dummy collar for 44 days. She was then tranquilized, fitted with the 23-pound collar, which provides information on body and air temperature and determination of the migratory habits of the elk, and rejoined the herd near Jackson Hole, Wyoming, showing no ill effects.

PROJECTED GOAL

The elk will be tracked to the summer grazing area of either the Grand Teton or Yellowstone National Park areas when the 7000-animal herd moves out of the National Elk Refuge within the next few weeks.

It is expected that this pilot project will develop ecological techniques that will make it possible to track endangered species in the future.

Smog: What Is Being Done to Save Man from Self-Annihilation

In the last twenty years a new element has arisen from the depths of technology which has not been looked on as an improvement of our society. This new element is known affectionately by the inhabitants of any big city (and now even in rural areas) as SMOG. Smog is a combination of smoke, vehicle emissions and other gaseous contaminants in the atmosphere.

PROBLEM FOR TECHNOLOGY

Since technology created smog and air pollution, it is therefore up to technology to do something about it. Thousands of researchers and scientists are working constantly on the elimination of the deadly smog from our atmosphere. Thousands of pages of documented research on this topic are now available through WESRAC.

WESRAC SEARCH DATA

A computer search done on the testing of motor vehicle emission displayed the following results:

There were 26 highly specialized documents concerning vehicle emission which contained 740 pages of scientific data. These documents came mostly from the United States where, obviously due to the advanced state of technology, smog is a more conspicuous problem than in most other countries. However, the search did contain documents from Russia, England and Canada.

INFINITE SOURCES AVAILABLE TO AID IN SOLUTION OF PROBLEM

A major contributor to smog is vehicle emission. WESRAC has information on this and on other facets of smog, its composition and elimination. A search on any of these topics can give you an almost infinite amount of vital data.

Fourth Pollution Factor

Our industrialized society in addition to air, land and water pollution is responsible for the pollution of the environment by noise. All of these take a biological toll on men and animals. Dr. Chauncey Leake, University of California Medical Center, says, "Noise is a stress, an environmental pollutant, and insult. It affects the nervous, endocrine and reproductive systems. It may damage unborn children." Dr. Samuel Rosen, Mount Sinai School of Medicine says, "Any loud noise, whether we like it or not, constricts blood vessels. Eventually, this could cause permanent damage." Considerable research by other scientists with white mice and rats confirms these opinions.

Dr. John Laufer, Chairman of U.S.C.'s Department of Aerospace Engineering, is the principal investigator for a research problem concerning jet noise abatement. The School of Engineering has recently received a $529,000 three-year grant from the U.S. Department of Transportation for continued research in this field.

There are 9274 references to noise in WESRAC's Data Banks.

MOLECULAR STRUCTURE ALTERED

Cone said the theory implies that the basic functional aberrancy—deviation from normalcy—producing both of these conditions, lies in an alteration of the molecular structure of the cell surface.

The Cone Theory proposes that the division of body cells (a normal process that goes on continuously) is controlled precisely by the pattern of ion concentrations on the surface tissue of the cells. The pattern is formed by the electrical voltage that normally exists across cellular surfaces and varies from one part of the body to another.

CENTRAL MECHANISM TO CONTROL CELL DIVISION

Cone noticed that cells having large negative membrane voltage seldom if ever, divide, while cells with small negative electrical potential divide at maximum rates. A comprehensive experimental test revealed that ion concentration differences between membranes did indeed exert a powerful control over cell division.

The Cone Theory proposes a central mechanism for control of body cell division, which if it proves to be generally valid, will provide a powerful new basis for research progress on many key biomedical problems, such as human conception, birth defects, growth, aging, and particularly cancer.

Cone's scientific contributions to the solution of the cancer problem are spin-offs from his basic investigations in the field of space radiation.

We are pleased to announce that WESRAC now has a TWX terminal equipped with an automatic answering service.
Our identification code and number is:
WESRAC USC TWX No. 910-321-2981

Theory Helps Explain Cancer Growth

A space scientist has devised and demonstrated a theory that helps to explain the source of uncontrolled malignant growth and indicates short cuts to the development of chemical countermeasures against cancer.

The scientist, Clarence D. Cone, Jr., is head of NASA's Molecular Bio-physics laboratory at NASA's Langley Research Center, Hampton, Virginia. The Cone Theory has provided, possibly for the first time, an explanation of the functional connection between the two major pathological features of cancer - uncontrolled growth of cells and their spread.

The Advantages of Microfiche

The NASA Scientific and Technical Information Facility photographs documents that it stores, page by page, to produce compact, inexpensive copies in accordance with Federal Microfiche Standards. Up to 70 pages of text can be recorded in an 18:1 reduction on a 4- 6-inch film rectangle, and every page can be read or duplicated with a magnifying device. The master films can be used to make either more microfiche or full-size copies of the original documents, and the cost of a microfiche copy is usually less than that of a hardcopy. These features have made it possible to keep large collections of documents wherever they may be needed. Many libraries now have microfiche viewers.

Word Definitions You Should Know

1. FALSE-DROP: refers to a useless, irrelevant data reference caused by an incorrect or poorly constructed question strategy for the scanning of computerized data tapes.
2. STRATEGY: the translation into computer language of descriptive terms by means of Boolean logic for the retrieval of relevant information.
3. HARDCOPY: the reproduction of the original document from which abstracts and citations have been made, generally reproduced from microfilm or microfiche of the orignial.
4. HARDWARE: in computer reference, the physical equipment or the actual computer itself as contrasted to ideas or design that may exist only on paper.
5. SOFTWARE: programming material, systems, etc. for a computer as distinguished from the physical components (hardware) of the computer itself.
6. BOOLEAN LOGIC: a mathematical analysis of logic. Applications of Boolean Logic include information retrieval and circuit-switching designs.

Erratum, May Issue, 1970:

Symbiosis: the living together of two dissimilar organisms in close association or union, especially when this is advantageous to both, as distinguished from parasitism.

Synergism: the simultaneous action of separate agencies which, together, have greater total effect than the sum of their individual effects.

WESRAC
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wesrac

WESTERN RESEARCH APPLICATION CENTER

computerized access to world technology

Dear Sir:

Management at all levels is being subjected to an unending flood of literature, journals, reports, books and periodicals. Much valuable time is spent looking for bits of information in mountains of material, much of it not relevant to their needs. This embarrassment of riches threatens to overwhelm researchers in many fields. How can you be helped to cope with the great volume of material you should read?

Many organizations have found the answer at Western Research Application Center. Enclosed is literature that briefly describes some of its resources and capabilities. Included also are abstracts, representative of the information available from the data banks. Attached is a category index.

To function effectively, technical manpower must be able to:

1. Avoid and overcome technical obsolescence.
2. Keep abreast of the current state-of-the-art.
3. Gain new information and technological capabilities required to advance the state-of-the-art.
4. Obtain all this information with a minimum investment.

Our objective is to provide you with the results of research and development from around the world. We would be delighted to discuss with you how this Technological Utilization service may be able to assist you.

Please call for a survey of your requirements. No obligation, of course.

Best regards,

John L. Wolcott

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APPENDIX D

1. WESRAC article in Long Beach Press-Telegram
2. WESRAC article in Industrial News

GIANT NASA DATA BANKS BOON TO BUSINESS LARGE AND SMALL

By EV HOSKING
Sunday Editor

Fourth in a Series

The nation's space program has given NASA and the Air Force an unprecedented opportunity to disseminate knowledge.

The impetus which it has given to human knowledge and education would make the program exceedingly sound as an investment even if that were the total payoff.

The program has become a focal point and a stimulant for the rapid advancement of general scientific and technical knowledge in this country and throughout the free world. It has provided the technological basis for the United States program in oceanology, a systematic drive to explore and put to use the enormous resources which lie under the seas. It has acted as a catalyst and stimulating challenge to education and has contributed new approaches and techniques to meet that challenge.

A KEY factor in the dissemination of knowledge is NASA's system of "knowledge brokers".

They have set up six regional dissemination centers, operated by university and research institutes to serve fee-paying industrial clients.

Their basic stock in trade is a huge warehouse of 750,000 abstracted and categorized documents which have been computerized for ready access.

NASA's own supply of knowledge is backed up by information furnished by the Space and Missile Systems Organization, Aerospace Corp. and other agencies of the Department of Defense as well as the Atomic Energy Commission.

These great data banks, or centers, are updated every two weeks and contain the latest scientific information encompassed by space research.

They are information gold mines to businessmen exploring new markets or employers seeking to keep their technical personnel abreast of developments in their fields.

These brokers of knowledge were set up by public law.

THE SPACE ACT of 1958, written after Sputnik I had shocked America into action, was explicit: "Each contract entered into for the performance of any work shall contain effective provisions which such party shall furnish promptly . . . a written report containing full and complete technical information concerning any invention, discovery, improvement or innovation which may be made in the performance of any such work. The Administration, in order to carry out the Purpose of this Act, shall . . . provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."

Regardless of motive — the public is the benefactor.

One large organization says that the data-bank service has saved them $1 million a year.

FEW REPORTS are that impressive, but a check of 14 companies during one quarter of last year showed that, as a direct result of center services, five companies had sales increases by $1 million, five effected production-cost savings amounting to $20,000, and four had labor savings of 1,000 man hours.

The system works like this:

John Doe has a small five-man company that makes marine radios for small craft. He wants to know everything he can about solid-state radio devices. So he pays the National Aeronautic and Space Administration $190 for a computer search of NASA's technical data bank.

For his $190, he gets the benefit of years of research done by major radio firms under government contract including specialized ways of constructing such transceivers.

The company expects the $190 investment will triple the sales in the next few years.

A small Idaho company interested in making oscilloscopes paid $190 for a computer search of NASA's technical-data bank. For its money, the company got the fruits of five years of research done by the Bendix Corp. under government contract including special techniques for building a special type of instrument. The company expects its $190 investment to produce $100,000 in sales.

A TEXTILE manufacturer in North Carolina went to the data bank with a quality control problem. The old equipment he was using could not maintain desired yarn consistency. The output was either too thick or too thin. The computer search turned up details of an infrared scanner that could be adapted to keep an electronic eye on yarn thickness and warning when it slipped out of tolerance. It is now in use.

An oil drilling concern designed a tool for directional drilling which could monitor the direction of the bore and warn if it got off the path. Construction was snagged because engineers were unable to find a motion sensor capable of withstanding the jolts and temperature changes it would have to take in its drill-head mounting. The data bank turned up a specialist who solved the problem and the device is now in production.

Through the data system a New England concern was able to convert a NASA-developed self-oscillating converter into a battery operated lightweight portable system for lighting airport runways.

The first of these data banks was established seven years ago at Indiana University. Since then, centers have opened at the Universities of Connecticut, New Mexico, Pittsburgh and Southern California and at North Carolina Science and Technology Center. The Centers are financed by NASA, but are rapidly becoming self sufficient through fees collected from clients.

HUGE FIRMS such as Litton Industries are paying from $1,000 to $5,000 a year to use the data banks.

Lockheed Aircraft, one of the nation's top aerospace contractors, gets some technical information faster through one of the data-bank computers than through its own vast research library.

The data banks are not the answer to every struggling businessman's dream. They are not a grab bag of treasure.

NASA officials point out they can only tell if an idea is feasible, it can be done within the realm of costs.

The idea, they say, has to be in the client's head when he comes to the bank.

Although it is possible to get a single search similar to that of the marine radio company, the banks urge clients to sign up for a full year's service with a much larger retainer.

One of the most popular services is a computer search of the entire data bank, tailored to answer a client's specific question. For $190 the computer will spill out condensations of technical reports describing all the work that has ever been recorded in the data bank on that particular subject. Then for another $300, the client can get a new search each month which keeps him up to date on new material being added to the bank.

FOR $50 a company can order a "standard interest profile," a list of condensations printed up periodically by the Centers on

(Continued Page A-15, Col. 1)

SPACE

(Continued from Page A-14)

tops of fairly general interest.

Having the proper information usually gives the client's own technicians a line of approach toward solving the problem, but where that information is not enough, the Center will go a step further and locate, through its computerized file, the most authoritative consultant for a given task.

With more than 700 customers now using the data banks, the list of regular clients is growing at 20 to 25 per cent annually.

The oldest center received fees of $300,000 in 1969, which made it virtually self-supporting.

The others are approaching that level.

When fees exceed the cost of maintaining the service, client charges will be reduced, increasing the attractiveness of the service.

THE BANK'S biggest problem is spreading the word — telling manufacturers about the tremendous amount of knowledge they have stored away.

Many potential users are unaware the service exists or they feel space research is too exotic for their needs.

In still another area of stored knowledge, NASA over a period of years has developed thousands of programs which are merely taped instructions telling a computer how to solve a problem or produce the required information for its stored input.

While a great many of the space programs are too sophisticated to be adapted to general use, many have applications to modern business.

The space agency has established the Computer Software and Management Information Center at the University of Georgia for the benefit of the business community.

COSMIC gets a continual flow of computer programs which are reviewed for their adaptability to use for other than which they were designed.

The Center currently has an inventory of about 1,000 such programs and a quarterly bulletin is issued listing those available.

NASA deliberately keeps the price low to attract interest. Prices run from $125 to about $1,200 per program — about one-half to one-tenth of what it would cost to develop a similar program from scratch.

COSMIC was started in 1966 and thus is still in its infancy but its output of knowledge indicates it may be one of the best investments made yet in the space program.

In the opinion of the military space agencies as well as the civilian organizations, the benefits in the field of education and knowledge within our grasp or even our sight today are only a fraction of those we may anticipate as our future of exploration and utilization of the great unknown that is space continues.

The questions are endless and the potential for knowledge is so great that it staggers the imagination.

SOUTHERN CALIFORNIA **Industrial News**

VOL. XXII NO. 41 TWO PARTS, 44 PAGES 4077 W. Pico Blvd., Los Angeles 90019 (213) 731-8821 $1.00 YR. 10¢ PER COPY MONDAY, JUNE 22, 19

Industry Turning to New Technology, NASA Data Bank Director Claims

Ed. Note: The following interview with A. K. Oulie, director of NASA's Western Research Application Center, was conducted by Larry Liebman, managing editor of Industrial News.

Question: A little less than a year ago, Mr. Oulie, we ran an interview in which you chided industry for having failed to use the billions of dollars worth of new technology in the data banks at WESRAC. I think our readers would like to know if industry is still resisting.

Answer: I think there has been a change. Industry, and particularly the civilian sector, has begun to search our data banks for new technology. Most important has been the changes that have occurred in society. Industry did not reject new technology because of stupidity or indifference. A few may have - but by and large there is a different reason - the cost syndrome straight jacket. Few people realize the intensity of the struggle in industry to reduce cost of manufacture. This is what I call the "cost syndrome," and I regard it as a straight jacket because real changes in a product by the adaptation of new techniques or materials is not only costly but the new products themselves will bear higher price tags.

Q: Is this happening now?

A: Yes - caused by several reasons, not the least of which is the general slow-down in business, inflation, and a rising consciousness on the part of the consumer. After a 10-15 year buying spree, the average consumer is beginning to question "planned obsolescence," which is really an inexpensive method of making people think they are getting something new.

Q: Do you have an actual example of this?

A: The automobile industry is considered the backbone or prime industry of at least three major countries, including the U.S.A. It has come upon bad times, as are other important industries. The buyer is beginning to ask if he can afford to own a car - that is, maintain it - and what it will be worth when he is through with it. The Volkswagon invasion of the U.S. auto market was really the first blow struck against planned obsolescence. The automotive industry didn't take it too seriously until the Volkswagon and then Volvo began to show soaring sales figures.

A few weeks ago the first advertising appeared on Chevrolet's new mini-car, the Vega. They guaranteed there would be no style change in the Vega for at least four years. And only this week, Ford announced its new mini-car, "the Pinto", guaranteeing it would not undergo a body change for five years.

Q: How does this relate - or as you said earlier - alter industries' attitude toward new technology?

A: When car sales slump, the economy is in trouble. So when the auto-makers begin to realize that planned obsolescence is not attracting buyers, it is reasonable to view this change as a portend of major shift in policy. We already have indications in such fields as TV, medical equipment, and machine tools that genuine technological improvements will be made.

Q: Do you have any indications of what direction these changes will take?

A: We can make some generalizations of the direction of the primary changes from the character of much of the research material done under contract for the Department of Defense, NASA, and the Atomic Energy Commission. The target of many searches was durability and reliability, particularly in the NASA program, where these were often achieved by miniaturization and modularization, which is the design and construction of a complex device machine in independent modules, each of which can be removed as a unit from the machine as a whole.

Q: . . . . . how does miniaturization fit into the picture?

A: Miniaturization, particularly in the area of microcircuitry, permits the reduction in size of parts of modules so that they can be taken off and easily carried. Microcircuits give us improved instrumentation, such as tiny sensors or devices of detection capable of alerting the operator to the exact place or part of a machine that is vibrating, over-heating, failed, or even beginning to fail. Incidentally, at WESRAC, we have over 3,500 documents relating to sensors and another 5,000 on detectors.

Q: I would imagine that the ability to real costs by means of computers would have a bearing on the use of new technology in industry.

A: That is true. A good example is seen in the aircraft industry. For many years the engine air intake scoops for planes were made of cast aluminum. With the advent of the jet plane, these "breather or intake scoops" became greatly enlarged and still aluminum was used. When it was first proposed to the air frame and engine builders to substitute titanium "breather scoops" for aluminum, they rejected the idea as too costly. For a saving of half the weight, the cost of titanium breathers was more than twice the cost of aluminum. Then someone in the titanium business went to his computer and figured out how much in maintenance costs could be saved by using titanium. He also pointed out to weight-conscious industry what it was costing an airline operator to lug hundreds of pounds of extra weight. Suddenly the prohibitive cost of titanium breather scoops wad dwarfed by the savings effected through their use. Today practically all big jets use titanium intake scoops. Incidentally, there are 17,862 references or documents on titanium in WESRAC's data banks; that is, its uses, methods of marketing, characteristics, etc.

WHO TO CONTACT

Southern California readers wishing to make use of NASA's Western Research Application Center can contact WESRAC, University of Southern California, 809 West 34th Street, Los Angeles, 90007.

APPENDIX E

1. Issued Abstracts Relative to Microfiche or Hard Copy Documents
2. Hard Copy Issued by STAR and IAA Category
3. Microfiche Issued by STAR and IAA Category
4. RDC Marketing/Service Contacts (Clients)
5. RDC Marketing Approaches (Non-Clients)
6. RDC Large and Small Business Contract Clients
7. RDC Annual Contract Clients by SIC code
8. RDC Large and Small Business Special Clients
9. RDC Special Clients by SIC code

APPENDIX E1

ISSUED ABSTRACTS RELATIVE TO MICROFICHE OR HARD COPY DOCUMENTS

(By contract quarters beginning 1 Feb. 1969)

	ABSTRACTS and CITATIONS	DOCUMENTS
1st Q 1969	2,703	538
2nd Q 1969	2,840	327
3rd Q 1969	3,313	574
4th Q 1969	2,260	445
Total 1969	11,116	1,884
1st Q 1970	2,225	427
2nd Q 1970	4,485	445
3rd Q 1970		
4th Q 1970		
Total 1970		

APPENDIX E2

HARD COPY ISSUED BY STAR AND IAA CATEGORY

(By contract quartors boginning 1 Feb. 1969)

Category	1st Q 1969	2nd Q 1969	3rd Q 1969	4th Q 1969	Total 1969	1st Q 1970	2nd Q 1970	3rd Q 1970	4th Q 1970	Total 1970
1	5	6	5	3	19	8	2			
2	4	3	15	19	41	21	3			
3	9	4	8	2	23	3	4			
4	7	3	8	10	28	18	6			
5	6	6	9	5	26	19	7			
6	10	12	10	10	42	17	7			
7	40	22	16	4	82	13	6			
8	39	17	31	10	97	11	9			
9	91	24	39	24	178	52	22			
10	16	15	7	4	42	2	3			
11	6	4	16	1	27	8	3			
12	3	0	8	1	12	5	1			
13	3	11	14	21	49	31	10			
14	32	22	17	50	121	47	14			
15	49	26	49	31	155	38	18			
16	12	0	15	3	30	5	1			
17	25	12	47	25	109	19	14			
18	15	17	25	19	76	17	14			
19	10	4	7	7	28	7	6			
20	7	5	11	7	30	10	10			
21	7	6	7	9	29	1	5			
22	0	0	7	3	10	2	3			
23	3	1	3	1	8	11	2			
24	1	4	5	2	12	2	2			
25	2	3	6	2	13	3	2			
26	35	3	1	12	51	14	9			
27	4	1	1	0	6	2	6			
28	3	3	6	1	13	8	2			
29	1	0	3	0	4	2	0			
30	3	4	9	11	27	7	6			
31	4	5	22	2	33	8	4			
32	34	17	61	18	130	20	19			
33	3	1	9	4	17	5	3			
34	17	10	15	6	48	3	5			
Other	32	56	36	22	136	64	191			
Total	538	327	548	349	1762	396	416			

APPENDIX E3

MICROFICHE ISSUED BY STAR AND IAA CATEGORY

(Byycontract quarters beginning 1 Feb. 1969)

Category	1st Q 1969	2nd Q 1969	3rd Q 1969	4th Q 1969	Total 1969	1st Q 1970	2nd Q 1970	3rd Q 1970	4th Q 1970	Total 1970
1			8	3	11	0	0			
2			4	32	36	1	0			
3			1	1	2	0	0			
4	NONE		0	3	3	1	1			
5			0	0	0	1	0			
6	ISSUED		0	5	5	2	1			
7			1	0	1	1	0			
8			0	3	3	0	1			
9			0	1	1	0	0			
10			0	0	0	0	0			
11			0	2	2	0	1			
12	NONE		2	2	4	0	0			
13			0	3	3	4	0			
14			0	19	19	6	0			
15	ISSUED		0	1	1	4	0			
16			0	0	0	0	0			
17			0	2	2	0	0			
18			0	2	2	0	1			
19			0	0	0	0	0			
20			1	2	3	3	0			
21			0	0	0	0	1			
22			0	1	1	0	0			
23	NONE		0	1	1	0	2			
24			0	1	1	0	14			
25			0	1	1	0	0			
26	ISSUED		0	0	0	0	1			
27			0	0	0	0	1			
28			0	3	3	0	1			
29			0	0	0	0	1			
30			0	0	0	0	0			
31			1	0	1	1	1			
32			8	6	14	2	1			
33			0	1	1	3	0			
34			0	1	1	1	1			
Other			0	0	0	1	0			
Total			26	96	122	31	29			

APPENDIX E4

RDC MARKETING/SERVICE CONTACT
(With Clients)

(By contract quarters beginning 1 Feb. 1969)

	TECHNICAL (Applications Engineers)		MARKETING	
Type Contact	Tele-phone	Visit	Tele-phone	Visit
1st Q 1969	91	41	86	41
2nd Q 1969	85	32	73	65
3rd Q 1969	90	40	83	63
4th Q 1969	81	30	68	37
Total 1969	347	143	310	206
1st Q 1970	120	40	46	27
2nd Q 1970	125	33	82	48
3rd Q 1970				
4th Q 1970				
Total 1970				

APPENDIX E5

RDC MARKETING APPROACHES
(Non-Clients)

(By contract quarters beginning 1 Feb. 1969)

TYPE	Direct Mail	Tele-phone Contact	Personal Presen-tations	Group Presen-tations	Ads (Paid)	Ads (Not Paid)	Journal/ Magazine Articles
1st Q 1969	0	600	220	5	2	**	1
2nd Q 1969	0	713	380	0	1	**	2
3rd Q 1969	1,461	442	337	2	2	**	8
4th Q 1969	7,300	226	178	12	0	**	6
Total 1969	8,761	1,981	1,115	19	5	**	17
1st Q 1970	25,824	319	89	5	0	**	2
2nd Q 1970	20,312	514	183	3	0	**	8
3rd Q 1970							
4th Q 1970							
Total 1970							

APPENDIX E6

RDC Large and Small Business Contract Clients

(Cumulative)

(By contract quarters beginning 1 Feb. 1969)

Small = under 500 employees

CLIENT SIZE	LARGE	SMALL
1st Q 1969	22	31
2nd Q 1969	24	33
3rd Q 1969	23	33
4th Q 1969	19	34
1st Q 1970	15	24
2nd Q 1970	16	38
3rd Q 1970		
4th Q 1970		

APPENDIX E7

RDC ANNUAL CONTRACT CLIENTS BY SIC CODE
(Cumulative)

(By contract quarters beginning 1 Feb. 1969)

(Continued on next page)

SIC Code#	1st Q 1969	2nd Q 1969	3rd Q 1969	4th Q 1969	1st Q 1970	2nd Q 1970	3rd Q 1970	4th Q 1970
1551	0	0	0	0	0	0		
1921	1	1	1	1	1	1		
1999	1	1	1	1	1	1		
2641	0	0	0	0	0	0		
2811	1	0	0	0	0	0		
2812	1	1	1	1	0	0		
2816	1	1	1	1	1	1		
2819	1	1	1	0	0	0		
2831	0	0	0	0	0	1		
2992	1	1	0	0	0	0		
2999	0	0	0	0	0	1		
3011	1	1	1	1	1	1		
3079	2	0	0	0	0	0		
3241	1	1	1	1	1	1		
3272	1	1	1	1	0	0		
3334	0	1	1	1	1	0		
3341	1	1	1	1	0	0		
3349	0	1	0	0	0	0		
3356	1	1	1	1	0	0		
3360	1	1	1	1	0	1		
3433	1	1	1	1	0	0		
3449	1	0	1	1	0	0		
3452	0	0	0	0	0	0		
3494	1	1	1	1	2	2		
3499	0	0	0	0	1	1		
3500	1	1	1	0	0	0		
3533	0	0	0	0	0	0		
3553	1	0	0	0	0	0		
3559	0	1	1	1	2	2		
3571	2	3	3	2	2	2		
3599	0	0	0	1	0	0		
3610	0	0	0	0	0	1		

RDC ANNUAL CONTRACT CLIENTS BY SIC CODE
(Cumulative)

(By contract quarters beginning 1 Feb. 1969)

SIC Code #	1st Q 1969	2nd Q 1969	3rd Q 1969	4th Q 1969	1st Q 1970	2nd Q 1970	3rd Q 1970	4th Q 1970
3611	1	2	2	2	2	0		
3621	0	0	0	0	0	0		
3639	0	0	0	0	0	1		
3641	1	1	0	0	0	0		
3643	1	1	0	0	0	0		
3651	1	1	1	0	0	0		
3661	1	1	1	1	0	0		
3662	4	6	6	6	5	4		
3672	0	0	0	0	0	1		
3679	4	4	3	3	2	3		
3690	1	0	0	0	0	0		
3694	0	0	0	0	0	0		
3699	1	1	2	1	1	1		
3714	0	0	0	1	1	1		
3720	1	1	1	1	1	1		
3721	1	1	1	1	1	0		
3722	1	1	1	1	1	1		
3729	2	2	2	2	2	2		
3811	2	2	3	3	1	2		
3821	1	1	1	1	0	0		
3831	0	2	2	2	2	2		
3841	1	1	1	1	0	1		
4833	0	0	0	0	0	1		
4924	1	1	1	0	0	0		
5912	0	0	1	1	1	1		
7391	2	2	2	2	0	4		
7392	0	0	0	0	0	0		
7821	1	1	1	1	1	2		
8911	1	1	2	2	2	6		
8921	2	2	2	3	2	2		
9100	1	1	1	1	1	1		
Mil.	0	0	0	0	0	0		
Bio.Med	0	0	0	0	0	0		
Total	53	57	56	53	39	53		

APPENDIX E8

RDC Large and Small Business Special Clients

(Cumulative)

(By contract quarters beginning 1 Feb. 1970)

Small = under 500 employees

CLIENT SIZE	LARGE	SMALL
1st Q 1970	3	26
2nd Q 1970	8	36
3rd Q 1970		
4th Q 1970		

APPENDIX E9

RDC SPECIAL CLIENTS BY SIC CODE
(Cumulative)

(By contract quarters beginning 1 Feb. 1970)
(Continued on next page)

SIC Code #	1st Q 1970	2nd Q 1970	3rd Q 1970	4th Q 1970
2099	1	0		
2999	1	0		
2834	0	1		
2840	0	1		
2843	2	0		
2873	1	0		
2899	1	0		
2911	1	0		
2999	0	1		
3069	1	0		
3295	1	0		
3511	0	2		
3531	0	1		
3532	1	0		
3560	2	0		
3599	1	0		
3629	1	0		
3660	2	0		
3662	1	1		
3671	1	0		
3672	1	0		
3679	1	0		
3714	0	1		

RDC SPECIAL CLIENTS BY SIC CODE
(Cumulative)

(By contract quarters beginning 1 Feb. 1970)

SIC Code #	1st Q 1970	2nd Q 1970	3rd Q 1970	4th Q 1970
3721	0	1		
3722	0	1		
3729	0	1		
3799	0	1		
3811	3	0		
3831	1	0		
3861	1	0		
3941	1	0		
3999	0	1		
4511	0	1		
7391	0	1		
Bio. Med.	2	1		
Total	29	15		